

GREEN JOBS AS AN ETHICAL ALTERNATIVE TO ACHIEVE A LOW CARBON ECONOMY

<http://dx.doi.org/10.21527/2237-6453.2022.58.11303>

Recebido em: 8/7/2020

Aceito em: 3/3/2022

Patrick Verfe Schneider¹, Cibele Roberta Sugahara², Luiz Henrique Vieira da Silva³

ABSTRACT

The world has increasingly demanded work alternatives that allow the combination of human capacities and potentials aimed at sustainable development and the decarbonization of business activities. Elaborated as a sustainable alternative, finding environmental protection and raising decent work, Green Jobs emerges as an ethical solution supporting a low carbon economy. Initiatives by global entities such as the United Nations Environment Program (Unep), the International Labor Organization (ILO), the International Employers' Organization (IOE) and the International Trade Union Confederation (CSI), present elements that are essential for the discussions and the articulation between contemporary concepts, in order to direct sustainable economic progress and social well-being. Therefore, the present work has shown initiatives that are moving towards a transition to a low carbon economy, based on economic activities that favor decarbonization, with a focus on the renewable energy sector in Brazil. The research method is characterized as qualitative with documentary procedure. As a result, the potential generation of green jobs stands out, especially in emerging countries, highlighting the possibilities of it to this sector in the Brazilian context. It was concluded that economic activities based on the green economy can generate new forms of production intended towards sustainable development, covering more dimensions than just the environmental one.

Keywords: green jobs, renewable energies, sustainable development.

EMPREGOS VERDES COMO UMA ALTERNATIVA ÉTICA PARA UMA ECONOMIA DE BAIXO CARBONO

RESUMO

Crescentemente o mundo tem demandado alternativas laborais que permitam a conjugação das capacidades e potencialidades humanas a serviço do desenvolvimento sustentável e da descarbonização das atividades empresariais. Elaborado como uma alternativa sustentável, encontrando proteção ambiental e elevação do trabalho decente, os Empregos Verdes surgem como uma solução ética em prol de uma economia de baixo carbono. Iniciativas de entidades globais, como o Programa das Nações Unidas para o Meio Ambiente (PNUMA), a Organização Internacional do Trabalho (OIT), a Organização Internacional de Empregadores (OIE) e a Confederação Sindical Internacional (CSI), apresentam elementos que suscitam a imprescindibilidade de discussões e a articulação entre conceitos contemporâneos, a fim de direcionar o progresso econômico sustentável e o bem-estar social. Sendo assim, o presente trabalho evidenciou iniciativas globais que rumam no sentido da transição para uma economia de baixas emissões de carbono, a partir de atividades econômicas que favorecem a descarbonização, com enfoque para o setor de energias renováveis no Brasil. O método de pesquisa caracteriza-se como qualitativo com procedimento documental. Como resultados, destacam-se o caráter promissor dos empregos verdes, sobremaneira nos países emergentes, salientando-se as possibilidades abertas para o setor no contexto brasileiro. Concluiu-se que as atividades econômicas pautadas na economia verde podem gerar novas formas de produção orientadas para o desenvolvimento sustentável, abrangendo mais dimensões que somente a ambiental.

Palavras-chave: empregos verdes, energias renováveis, desenvolvimento sustentável.

¹ FMC Agrícola. Campinas/SP, Brasil. <http://lattes.cnpq.br/4216712319801854>. <https://orcid.org/0000-0003-2654-9264>

² Autora correspondente: Pontifícia Universidade Católica de Campinas, Faculdade de Ciências Econômicas Contábeis e Administrativas. Rod. Dom Pedro I, Km 136 – Parque das Universidades – CEP 13086-900 – Campinas/SP, Brasil. <http://lattes.cnpq.br/5238484631071657>. <http://orcid.org/0000-0002-3481-8914>. cibele.sugahara@gmail.com

³ Universidade Estadual de Campinas. Programa de Pós-Graduação em Ambiente e Sociedade. Campinas/SP, Brasil. <http://lattes.cnpq.br/0022704260486179>. <http://orcid.org/0000-0002-7793-4923>

INTRODUCTION

Achieving sustainable development through decent work has proved to be a path for all nations to follow since the 2030 Agenda for Sustainable Development was enacted in September 2015. However, the reality of most countries has shown just the opposite: on the one hand, the scrapping of labor relations has driven millions of people into informality; concomitantly, much of the work motivated by the transformation of natural resources into goods and services has irreversibly degraded ecosystems and accelerated serious socioeconomic problems, requiring greater attention to the phenomena arising from the planet exploration, which already communicate an impediment to the maintenance of the life on Earth.

Despite the human needs is a labor central demand, we can see, mainly throughout the pandemics, the crescent numbers of precarious labor motivated from unformal work what happened cumulatively with a sustainable unbalance activity based on delivery or micro logistics promoted by companies using algorithm management, where sustainability is not a priority (RODRIGUES *et al.*, 2021).

The understanding of the adoption of measures oriented towards new developmental alternatives that prioritize more sustainable models to work is notorious, due to the raising information in order to point an emergent new economy, however there is a latent space for the creation of a new green agreement between employees and companies guidance to enhance a mitigative industrial impact (GUARINI; OREIRO, 2022).

Covering the concept of intergenerational justice, it is understood that the exploratory activity of a generation will have an impact in the coming years, resulting in medium and long terms costs. Even today, the human species demonstrates an inability to answer whether it will be possible to pay off such debt with future civilizations (GEORGESCU-ROEGEN, 2012). Besides, by perpetuating the dominant model of production and consumption, the answer tends not to be positive.

In this scenario, the development of economic and labor models that mitigate the impacts of human activities on the natural environment shared by the human species with other forms of life, for which the health, sanitation and balance of man on Earth depend, while they move towards the valorization of human life, placing people as an end, and not as a means, of economic relations. Thereby, a new dimension of work and production oriented to the needs of the planet has been developing with a strong capacity to generate a positive impact at global community: it is the so-called green jobs, paid activities that promote the creation of elements to neutralize large business organizations and worldwide industrial activity (VEIGA, 2010; NIETO, 2017).

This kind of job have a wide range of occupational profiles, skills and educational elements, which contribute to the constitution of new types of careers, which have not existed until then, even if derived from traditional occupations and which have a partial or complete distinction with the origin activity. These new careers generate activities related to the generation of clean energy, arising from the wind and solar chain, as well as the neutralization of the environmental footprint provoked by society in general and the entire journey to ease carbon emissions into the atmosphere (PNUMA, 2008).

And, in a complementary way, the incorporation of the ecological dimension into economic, labor and interdisciplinary models in the business environment act as promoters of scientific research, oriented to the evolution of the business ecosystem as a whole, building new niches, where nothing existed before (FREITAS; FREITAS, 2016).

Consequently, this article addressed the challenge imposed on countries for decarbonization, to be achieved through a decrease in the use of materials and energy, mitigating the impacts of climate change and, therefore, promoting urgent social development. The focus was aimed at Brazil, which, despite its immeasurable bioeconomic potential (SACHS, 2008), still faces a long path to transition to green jobs. Even so, the exposed advantages and opportunities show that the possibility of this transformation happening is increasingly emerging in a short-term due the Brazilian potential to evolve on subject.

METHOD

This research adopts a qualitative approach, focusing on the identification of studies developed by global entities such as the United Nations Environment Program (Unep), International Labor Organization (ILO), International Organization of Employers (IOE), and International Trade Union Confederation (CSI) based on initiatives for a low carbon economy.

As for the objectives, it adopts an exploratory perspective, based on the technical procedure of bibliographic and documentary survey. Exploratory research is intended to make the problem explicit (GIL, 2010). In Severino's perspective (2007) exploratory research seeks to gather information about an object, delimiting a field of work. Documentary research is based on documents that have not been analyzed in an analytical way or that can be reworked according to the research objectives (GIL, 2010).

Regarding the sources, data collection was carried out based on documents published by: International Labor Organization (ILO) and the Ministry of Mines and Energy of Brazil and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. For the selection of documents, a pre-analysis was used to control the credibility and relevance for green jobs. The selected documents were:

- (1) Work for a brighter future – Global commission on the future work (ILO, 2019);
- (2) International Energy Initiative Brazil (Ministry of Mines and Energy of Brazil and Deutsche Gesellschaft für Internationale Zusammenarbeit, 2019);
- (3) Green Jobs in Brazil: how many there are, where they are and how they will evolve in the coming years (ILO, 2009);
- (4) Green Jobs: towards decent work in a sustainable, low-carbon world (PNUMA; ILO, OIE, CSI, 2008); and
- (5) Renewable Energy and Jobs Annual Review 2019 (IRENA, 2019).

The sources of information were chosen considering the well-known recognition of organizations that discuss the topic of green jobs, at national and international levels. Subsequently, the data used in the article were selected from reports that show the potential for generating green jobs for the transition to a low carbon economy.

In this research, for the selection of economic activities that promote green jobs, the activities that contribute to reducing emissions or improving environmental quality were adopted as criteria, according to the classification adopted by ILO (2009). More specifically, activities related to the renewable energy segment were chosen according to their potential for generating green jobs in the coming decades, as pointed out in the ILO studies (2018, 2009, 2019).

Another argument that guided the delimitation of renewable energy activities is the potential for generating green jobs in Brazil from three sources: biofuels, solar and wind, ordered according to the potential green jobs in the country and based on the publication of the International Agency for Renewable Energies (IRENA, 2019).

THEORETICAL FRAMEWORK

Sustainable development and green jobs

Work as a promoting element in the development of all human potential has also placed them as individuals dominating the natural environment, becoming capable of transforming the inhabited world. However, this transformation in the relationship between human beings and nature has caused a set of problems for terrestrial ecosystems, such as the reduction of natural resources, partially or completely, the mass extinction of various forms of life, and the climate emergency through which the world is currently going through (BOFF, 2016).

Considering only the needs of human beings, when defining parameters capable of guaranteeing their sustainable development, however, isolating the universe of the planet's emerging needs, puts at risk not only human species, but also, all consort species around the globe, bearing in mind that labor security prioritizes human growth, and not its surroundings (PNUMA, 2008).

As it seeks to stimulate a global community, based on an international agenda, the space for prioritizing the individual is reduced to the detriment of other fundamental agents on the planet. Thus, address work as it is known in current times, guaranteeing people, regardless of their individual characteristics, the same conditions of access, development, economic growth and social insertion, necessarily involves the agent's involvement in the search for a minor impact on community and world scales due to labor practices.

This integration may motivate greater care on the companies' side, regarding planetary protection, thus benefiting all existing forms of life and those that will follow them, the maximum manifestation of the sustainable development (SACHS, 2008, 2009; BOFF, 2016; VEIGA, 2013).

In addition to this unprecedented moment of expanding intergenerational justice and, observing the possibility of integrating green jobs into this effort, the International Labor Organization (ILO, 2013, p. 4-6) defines green jobs as being

[...] the transformation of economies, businesses, work environments and labor markets towards a sustainable economy that provides decent work with low carbon consumption.

[...] For "green jobs" to fulfill this key role in a development without social exclusions, they must be decent providing adequate incomes, social protection and respect for workers' rights and allowing these workers to express their opinion in decisions that will affect their

lives. Investments in the development of technical knowledge are an essential condition for the sustainable growth of economies and companies, but they are still little used.

For the ILO (2013, p. 3), green jobs can meet two fundamental challenges of the 21st Century: the first is to mitigate climate change, which is accelerating due to the exploitation of the planet by economic activity; and, second, to provide social development and decent work for all human beings on the planet, especially for those on the margins of society, such as workers in poverty, the unemployed, young people looking for jobs, and people without social benefits, access to electricity and adequate housing”.

In 2018, the ILO developed another study entitled “World Employment and Social Outlook 2018: greening with jobs”, in which it considers that the world of work has a strong relationship with the environment. Therefore, it states that green jobs should be seen as sources for the transition to environmental sustainability (ILO, 2018).

In consent with these aspirations, Bonelli and Lazzareschi (2015, p. 239), when addressing the trends and challenges of green jobs in Brazil, point out that

the search for effective sustainability can be established through a generation of green jobs which, aligned with sustainable development, constitutes an effective way of building a new global society, based on the harmony between economic means, the environment, the promotion of fundamental social rights, the use of innovative technology and the continuous improvement of the social conditions of workers and society.

Sulich, Rutkowska and Popławski (2020, p. 5) claim that “traditional employment patterns are being replaced by various atypical forms, and employment instability represents a significant threat”. Combined with this threat to employment, are the climate emergency and depletion of natural resources, both of which are harmful especially to the youngest, if humanity is not able to mitigate its impacts. Therefore, after discussing the situation in three European countries, Poland, the Czech Republic and Belgium, argue that these problems can be solved by promoting green jobs and the development of the green economy, since these measures are conditioned by responsible and sustainable development strategies, such as investments in renewable energy sources, recycling and reduction of greenhouse gas emissions, for example.

For the sustainable labor society, or with characteristics of green employment, to real exist, according to the thinking of Littig and Grießler (2005, p. 13) it will require at least the combination of three factors, in their words:

- I. the “ecologization” of current jobs and the creation of new environmentally healthy jobs, in order to guarantee the provision of environmental, social and health goods and services;
- II. the gender-sensitive redistribution of all the work that needs to be done in society, so that everyone can have a sufficient income from useful and accepted work by the public (for example, through shorter working hours, day care centers, working life, balance between men and women, saving care work, etc.);
- III. the freedom to choose at any moment of life between different forms of work (work organization, work area) or lifestyles, always having the right to individual social security.

Linking green jobs and local development, and addressing two Italian cases, Battaglia, Cerrini and Annesi (2018) point out a series of conditions and barriers that allow the creation of green jobs and the development of local green companies: stakeholder cooperation, as well

as the interaction between industries and research, emerge as the main determining factors; on the other hand, bureaucracy, market uncertainty and a lack of investments in infrastructure are revealed as barriers to the creation of green jobs and the development of local green businesses.

Aldieri *et al.* (2019), when analyzing the impact of green innovation on employment in the USA, Japan and Europe, showed how environmental repercussions have a positive impact on employment. In addition, they highlight direct subsidies, such as funding for research and development in green technology, or indirect subsidies for research, such as tax exemption for industrial investments in green production, as responsible for the positive effects on employment levels and the economic system in general. In other words, for the authors, the taxation of polluting activities can produce positive effects, inducing companies to invest more promptly in research activities to improve or reconvert polluting productive activities.

Also, for the authors, Research and Development (R&D) activities in clean production have a strong impact on the knowledge of individual companies that affect their investment decisions, considering that they react positively to the allocation of subsidies directed to R&D in clean technologies, and this diversified process must be properly taken into account at a national level.

Even though green employment is a fundamental factor, regarding the sustainability element, it should not be understood that the sustainable fact of the activity, alone guarantees, the condition of being considered a decent job, given that there are less conditions harmful to the planet that can expose the individual to unhealthy or degrading conditions at the end of the day. It is understood, then, that “not all green work can be considered decent, simply because it meets environmental sustainability standards” (OLIVEIRA; CECATO, 2016, p. 223).

The report “Green jobs: towards decent work in a sustainable, low-carbon world”, elaborated by the United Nations Environment Program, for example, highlights cases such as the recycling industry or the production of inputs for biofuels, which, although their activities are essential for the transition to a low carbon economy, the precarious working environment and the conditions to which workers are subjected prevent these functions from being considered decent. Violation of fundamental human and labor rights may also result in the impossibility of characterizing an allegedly green job as decent. This is accentuated by the growing informality and inequality observed in the globalized economy, especially in poor and developing countries (PNUD, 2019).

We must think about a universe of activities that can collaborate with the planet, the same way that it contributes to the social sustainability and necessary protection of the individual, since both the natural and work environments can be irreparably degraded (OLIVEIRA; CECATO, 2016).

Therefore, for a green job to be endorsed, not only the environmental dimension of sustainability must be considered. This understanding should be expanded based on the dimensions proposed by Sachs (2002), for example, which lists, in addition to the three basic pillars, environmental, economic and social, also the cultural, psychological, national political, international political and institutional pillars.

In addition, contributions such as the expansion of opportunities, substantive freedoms (SEN, 2010) and dimensions such as those proposed by the 2030 Agenda for Sustainable Development, namely People, Planet, Peace, Prosperity and Partnerships, can also guide what can be effectively considered a green and decent job, and not only environmental-friendly.

In this sense, Abramovay (2012, p. 137) teaches that “incorporating environmental, ethical and even social equity values into the markets themselves”, points to a new economy, centered on a genuinely green approach.

Addressing this issue from a quantitative perspective, the United Nations Environment Program (Unep), in 2008, analyzed the potential for generating the so-called green jobs in different business segments. The result of this survey was replicated in Table 1.

Table 1 – Development of Green Jobs

		Greening potential	Advances in creating green jobs (until now)	Long-term potential for creating green jobs
Energy	Renewable energy	Excellent	Good	Excellent
	Carbon capture and sequestration	Moderate	None	Unknow
Industry	Steel	Good	Moderate	Moderate
	Aluminum	Good	Moderate	Moderate
	Cement	Moderate	Moderate	Moderate
	Paper and cellulose	Good	Moderate	Good
	Recycling	Excellent	Good	Excellent
Transportation	Fuel efficient cars	Moderate to good	Limited	Good
	Public transportation	Excellent	Limited	Excellent
	Rail	Excellent	Negative	Excellent
	Aviation	Limited	Limited	Limited
Construction	Green Buildings	Excellent	Limited	Excellent
	Renovation	Excellent	Limited	Excellent
	Lighting	Excellent	Good	Excellent
	Efficient equipment and appliances	Excellent	Moderate	Excellent
Agriculture	Small-scale sustainable agricultural activities	Excellent	Negative	Excellent
	Organic agriculture	Excellent	Limited	Good to excellent
	Environmental services	Good	Limited	Unknow
Forestry	Reforestation	Good	Limited	Good
	Agroforestry	Good to excellent	Limited	Good to excellent
	Sustainable forest management	Excellent	Good	Excellent

Source: PNUMA, 2008.

Table 1 shows the emergence of activities directly linked to sustainability. In addition, although migration has not yet taken place, or the transformation of traditional activities into green jobs, there is a long-term latent potential for this transformation, with the construction industry being the environment in which the expectations for this migration are the highest, considering the urgent changes oriented to energy consumption, waste disposal, the optimization of water consumption and the peripheral impacts of the works promoted around the constructions.

Also, agriculture and transport show a high potential for transforming the activities carried out, proposing an even more sustainable format, as society advances in the growth of its expectations for a green economy, which allows putting the sustainability agenda at the center of the discussions, this transformation process tends to be accelerated due to the opportunities to raise the sustainable development agenda (ABRAMOVAY, 2012). Also, with great potential for social and environmental contribution, the renewable energy sector stands out.

Decarbonization process of the economy: ethical issues for a low carbon economy

It is known that the dominant economic system prioritizes the valuation of products of the manufacturing industry or the rise of services detached from the prevention or mitigation of their impacts on the environment. Therefore, pollution is considered a “negative externality”, as it does not figure as a concern in the mechanistic models of the neoclassical economy (GEORGESCU-ROEGEN, 2012; RAWORTH, 2019).

Taking into account that the climate regime, the main environmental regime, is an important frontier to be crossed in global ecological terms, it is possible to admit that this reality constitutes a daily threat to the planet, considering that large corporations omit social and environmental responsibility as a foundation of its performance strategies (VEIGA, 2015; BARBOSA *et al.*, 2015).

As taught by Veiga (2015, p. 160), despite a good part of the carbon emissions is “absorbed and recycled by the oceans (30%) and by the vegetation of the continents, mainly some forest ecosystems (more than 30%)”, even so, “the fraction that goes into the atmosphere (about 40%) will remain there for more than 100 thousand years”.

In the same matter, Daly (2002, p. 173) points to a healthy use of the planet’s resources, in which the emission rate “should not be greater than the capacity to be recycled, absorbed or neutralized” by the atmosphere.

As proposed by Boff (2016, p. 149), “it does not matter what way of production exists in a society, but there are a number of fundamental needs that belong to the human condition”, or on the other hand, regardless of the wealth produced by an industry, attention must be paid to vital elements for the maintenance of human life on Earth, for this and future generations. In this context, Daly (2002, p. 173) states that sustainability is “a way of affirming the value of intergenerational longevity and justice, while recognizing mortality and finitude”.

Accordingly, Sen (2011, p. 306), states that “the kindness of the states of affairs and the appreciation of policies, for a long-time placed happiness at the center of the evaluation subject”. Thus, it appears that the transformation industry, by making available the material needs of human beings, which generate happiness, would have a kind of safe conduct to operate despite the damage generated.

In fact, “due to man’s fascination with comfort and novelties, all innovation leads to growth” (GEORGESCU-ROEGEN, 2012, p. 105), thus contributing to deplete the natural resources available on the planet and generate even more waste in a state of high entropy. Nevertheless, even though human well-being is directly linked to the satisfaction of material needs, it is necessary to reflect on the maintenance of the planet earth and also on how its agony, leveraged by the uncontrolled emission of gases that cause the greenhouse effect, can imply negative effects on freedoms, opportunities and human health in the medium and long term.

Following the same thought, Veiga (2015, p. 160) highlights the demand for a “profound change in energy matrices”, due to the “profoundly serious geopolitical fractures that this inevitably causes”. Thus, it is understood that industries spread across the globe appear as key players in the decarbonization of the transformation activities, supported by legislation related

to the theme, endorsed by governments and international organizations. Therefore, the author states that this is the reason why global warming “appears as a ‘civilizing’ issue”.

Economic development, as well as its articulating thought of social development, had as its main highlight the look applied by current economic problems and, based on this, presented solutions aimed at the benefit of the society as a whole (GEORGESCU-ROEGEN, 2012).

Thus, it is to be expected that the production of energy based on coal burning, the use of thermoelectric and other non-renewable energy sources that considerably degrade the atmosphere, cannot be considered as exclusive sources of developmental factors, given the perverse legacy to which future generations of our species will be affected.

There are organizations engaged in the full review of their facilities, as well as oriented to reexamine their processes, introducing, for example, reverse logistics that allow access to their product throughout its life cycle and thus, guaranteeing an appropriate disposal, avoiding an ecosystem degradation. However, there is still a low level of engagement regarding the review of emissions, with space for global emissions targets to be an internal mantra in organizations and markets which are inserted as active participants (ELKINGTON, 2012; BARBOSA *et al.*, 2015).

Knowing that a new low-carbon economy focuses on a constant search for minimizing socioenvironmental impacts, which represent a risk, while demonstrating a great opportunity, for companies around the globe, innovation linked to sustainability, or the so-called “eco-innovation”, presents itself as a competitive differential regarding the intentions and protocols signed in the last decades (PINSKY; KRUGLIANSKAS, 2017). About this, Abramovay (2010b, p. 1) clarifies that “producing and consuming not only emitting less carbon, but using less energy and less materials, is the most relevant dimension of recent industrial inventions and discoveries”.

The joint target of the global community regarding climate change is linked to agreements and protocols around the planet. The main document in this regard is the Paris Agreement (UNFCCC, 2015) developed during COP21, in Paris, France.

Signed in November 2015 by 195 state members of the United Nations Climate Convention, the central goal of the Paris Agreement was to reduce global emissions of greenhouse gases and limit the increase in the average temperature of the Earth by 2°C above pre-industrial level, with efforts to maintain at 1.5°C for the next years (UNFCCC, 2015). Coinciding with the end of the cycle of the Kyoto Protocol, which would end in 2020, the agreement has as its horizon the beginning in the same year of a new cycle of commitments (DI PIETRO, 2019).

In addition, SDG 7, aimed at “ensure access to affordable, reliable, sustainable and modern energy for all”, and SDG 13, aimed at “take urgent action to combat climate change and its impacts” (NAÇÕES UNIDAS BRASIL, 2015), of the 2030 Agenda, emerge as instruments to overcome this challenge.

RESULTS AND DISCUSSION

According to the International Labor Organization, if the Paris Agreement is reached, 18 million jobs will consequently be created, as it is estimated that 24 million will be created and 6 million will be lost (ILO, 2018). In this way, the ILO stresses the need for complementary policies during this process, protecting workers while ensuring a fair transition.

Oliveira and Campos (2017, p. 228) affirm that “the energy sector [...] through the primary exploration of renewable energies, holds significant potential to offer green jobs”. According to the report by the International Renewable Energy Agency (IRENA), in Brazil the biofuels sector remains the most important employer in the renewable energy sector. In 2018, more than 11 million jobs related to renewable energies were registered, of which 1.125 million were in Brazil (IRENA, 2019, p. 24). The document points out that, in the country, biofuels stand out, with 832 thousand jobs, solar water heating, which employed 41 thousand people, photovoltaic solar energy, with 15.6 thousand jobs and wind energy, which filled 34 thousand job openings (IRENA, 2019, p. 25).

The ILO report (2009) points out that the activities of generation and distribution of renewable energies and waste management are the most widespread among large companies and warns to the challenge of identifying how much these activities generate in terms of new jobs, since the available statistics do not allow an accurate assessment of this amount.

This matter, on the one hand, is a positive process that corresponds to the use of biomass (ethanol) by the sugarcane plants themselves and the supply of energy to the electrical network, which includes the use of hydroelectricity sources. However, on the other hand, the general pattern of energy use does not change significantly, which represents a risk that the industry is not in sync with the global parameters that guide contemporary innovation and where the reduction in energy intensity is decisive.

Oliveira and Campos (2017, p. 244) add that the generation of green jobs is also “related to the individual potential of each activity, even considering the location where it will be developed”, idea corroborated by Ortega et al. (2020), that, based on an analysis of the European Union context, conclude that the creation of green jobs in the coming years will depend heavily on the developing of scenarios and assumptions.

Freitas and Freitas (2016, p. 122-125) affirm that “building a world powered by renewable and clean energy” is one of the greatest challenges for all human beings on planet Earth, and this matter “constitutes a challenge to humanity, concerned with fighting climate change”. In order for this to be achieved, it is fundamentally necessary to “end racial issues, [...] in the consolidation of the ethical contract [...], the multicultural and solidary coexistence of peoples”, explaining the complementarity of production clean energy and socio-economic sustainability.

Bonelli and Lazzareschi (2015, p. 231) point out that the study “Green jobs for the poor: why a public employment approach is needed now?” Published in 2010 by CIP-IG (International Policy Centre for Inclusive Growth), a UNPD branch, in partnership with the Brazilian government, “It signals that in a developing country, like Brazil, investing in the generation of jobs in the so-called “green economy” can be a good solution to reduce poverty”. This extends to other developing nations, that face severe problems originated from historical inequities.

Thus, the next topics highlighted the state of the art of the three main branches of renewable energy production in Brazil (IRENA, 2019), biofuels, solar and wind, focusing the creation of green jobs in each of these categories.

Biofuels

In Brazil, “biofuels are responsible for generating the largest number of green jobs” (IRENA, 2019, p. 25), as highlighted in the theoretical framework.

In this area, the state of São Paulo stands out, which according to the 2012 Annual Social Information List (Rais), of the Ministry of Labor and Employment (MTE), has 142 thousand companies operating in the sector, employing 1.6 million of people in the state, representing almost 1/3 of the country's green jobs (INVESTSP, 2013).

However, the consultancy *Ideia Sustentável* (2013) emphasizes that biofuels, despite responding affirmatively for the generation of jobs through the cultivation of sugar cane for ethanol production, are inevitably responsible for “negative impacts on the environment, such as soil exhaustion, forest degradation, siltation and river pollution”. Therefore, the legitimacy of these green jobs is questioned.

Solar

Estimates indicate that 3.6 million people were absorbed by the solar energy industry in 2018 alone, with approximately 57,000 just in Brazil, among solar water heating and photovoltaic solar energy (IRENA, 2019, p. 21). Yet, the main solar heating and cooling markets, including China, Turkey and Brazil, were in decline in that year. In fact, the Brazilian market fell 1.1% in 2018, the third consecutive year of reductions (ABRASOL, 2019).

Even so, the Brazilian Association of Solar Photovoltaic Energy (ABRASOL, 2019) estimates that 15 thousand new jobs were generated in 2019 due to new installations of complexes aimed at the generation of photovoltaic energy in the country. This movement expresses the singularity that solar energy represents in terms of transition to a low carbon economy, which in the words of Georgescu-Roegen (2012, p. 132) represents “the only clean and essentially unlimited source”.

Wind

The verification of the negative impact caused by the 2008 financial crisis to the wind energy sector in Europe and the United States is corroborated by Simas and Pacca (2013). For this reason, the importance of diversifying the performance of companies in terms of allocating investments to emerging markets such as Brazil is reinforced (SIMAS; PACCA, 2013).

In fact, Oliveira and Campos (2017, p. 244) emphasize that the advantages arising from the renewability of production and minimal negative environmental impacts resulting from the use of wind energy “have the ability to demonstrate the potential of the sector for green employability”. Simas and Pacca (2013) point out that this is the clean technology that has grown the most in the last decade, bringing environmental and social benefits to several countries.

Observing the growth of this sector, which accompanies the need for alternative energy sources, Simas and Pacca (2013) projected the generation of 195 thousand new jobs between the years of 2010 and 2020, considering the demand for the installation and operation of wind farms in Brazil, something that, according to the authors, can also contribute to the regional development of places such as the inland of Bahia and Rio Grande do Norte, by generating local jobs, and coexisting with other economic activities, such as agriculture and livestock, since the capacity of wind power generation in Brazil, in 2018, jumped to fifth place in the world, with more than 85% of it concentrated in the Northeast region (IRENA, 2019, p. 26).

Thus, “the low remuneration of a significant portion of the sector’s employees, added to the dangers that arise due to the handling and operation of very high equipment or with electrical current, in addition to suffering with the effects of the pollution caused, prevent the Brazilian generation of wind power to be considerate favorable to green employability” (OLIVEIRA; CAMPOS, 2017, p. 244). In this regard, Lucena and Lucena (2019, p. 82) emphasize that:

The installation of wind farms, combined with efficient resource management and regional development policies, can contribute significantly to the development of rural communities, especially on the coast and in the backcountry of Brazil. In this way, technological innovation and industrial development, distributed generation and universal access to energy, regional and local development, especially in remote areas, and job creation were considered the main socio-economic benefits of wind energy in the country.

In addition, Lucena and Lucena (2019) point out that the deficit in professional qualification appears as an obstacle to hiring workers at the local level.

If this reality is transformed, internalizing the requirements for a green job in this field of activity and developing educational policies that allow the training of professionals qualified to perform functions in this area, the wind energy sector may have its great potential used in Brazil, with gains for workers and with the possibility of bringing the country closer to international standards of sustainable development. This also includes investments and research for the development of new technologies, to reduce the price of wind energy in the country (LUCENA; LUCENA, 2019).

Procedures to boost the generation of green jobs

In Brazil, public policies are still insufficient to anticipate to social actors actions guided towards a strategy of expanding human freedoms in the context of the sustainable use of biodiversity. In contrast, as much as there is room for measures aimed at generating jobs supported by the green economy, in Brazil, the dominant patterns of production and consumption do not show a prudent attitude to mitigate negative impacts on the environment (ABRAMOVAY, 2010a). This debate around procedures to generate jobs should consider compensating for environmental damage caused by certain economic activities by other activities (VEIGA, 2015).

The concern with an energetically clean future is based mainly on “efficiency in the use of energy and materials”, with a focus on technological innovation. In order for this requirement to be met, it is imperative to rethink and radically modify the way energy management in the world is carried out (ABRAMOVAY, 2012).

In this context, among the measures to boost the generation of green jobs, the work of *Mitsidi Projetos* in partnership with the International Energy Initiative (IEI Brasil) presents proposals and guidelines that can be discussed within the scope of sustainable development governance.

This was “the first attempt to quantify the number of jobs in the energy efficiency (EE) area [...] by raising the number and level of training of current direct, indirect and induced jobs and projecting future scenarios (until 2030, horizon of the Paris Agreement), to serve as input for decision making on future training and other forms of planning and investment in the EE

area”. And, the results point to a great potential for generating jobs directly or indirectly linked to EE until 2030, meeting the Brazilian demand for these activities, especially in the industry and construction areas.

Further, in a study carried out by the ILO (2009) in Brazil, it was highlighted that the creation of green jobs in activities of generation and distribution of renewable energies that have a clean energy matrix favor the generation of jobs in areas of economic activities such as: sugar cane cultivation, alcohol and biofuels manufacturing, among others.

Other initiatives for the promotion of green jobs developed by the Brazilian federal government according to Meneguín (2012) refer to the Energy Efficiency Label in Buildings of the National Electricity Conservation Program (Procel), created in 1985, which aims to encourage actions of energy efficiency seeking to reduce environmental impacts (Procelinfo); the Brazilian Habitat Quality and Productivity Program (PBQP-H), in 1998; which aims to improve the conditions of habitat quality and productive modernization based on principles of sustainability, and the *Selo Casa Azul* of the Brazilian bank *Caixa Econômica Federal* (CEF), created in 2009, granted to housing proposals that contemplate socio-environmental solutions in its design, execution, use, and occupation.

There is also the *Finame*, a financing program for the purchase and sale of solar and wind power generation systems and solar heaters promoted by the Brazilian Development Bank (BNDES).

In addition to these measures, government stimulus with tax policies and the granting of benefits and events can contribute to the expansion of activities aimed at green jobs. The Brazilian energy sector “by joining to the CO₂ reduction targets, at the Copenhagen Conference, sought renewable energy that did not waste natural resources” (PAULI; GRECO, 2018, p. 45).

It was not by mistake that, in 2019, the country emerged as the leader in investment capacity in the sector (GLOBAL..., 2020). This condition is expanded, considering that the whole Latin America has particularities that serve as advantages for the generation of renewable energies, the main one being the excellent resources for the generation of wind, solar and biomass energy in its territory (GLOBAL..., 2020).

However, there was a sharp transition in the Executive Branch at the federal level, which culminated in a profound reorientation in Brazilian public policies. An example of this change is the sanction of the Pluriannual Plan (PPA), which defined the budget for the 2020-2023 quadrennium, with a veto to the 2030 Agenda for Sustainable Development (AGÊNCIA..., 2019). In addition, the socioeconomic crisis caused by the Covid-19 pandemic signaled a setback in a series of sustainable practices, particularly in Brazil, given the inestimable tragedy of thousands of human lives lost and the severe economic recession.

Even facing these adversities, green jobs are emerging as a solution, as indicated by Hepburn et al. (2020), that endorsed an analysis by the International Renewable Energy Agency (Irena) in pointing out that renewable energy sources can generate more jobs in the short term, when compared to traditional stimulus packages, favoring fossil energy.

Another remarkable fact refers to the World Bank’s approval of a loan of US\$ 38 million for the Project to Strengthen the Energy and Mineral II Sectors, to be implemented in Brazil, which, “in the first phase, the technical assistance provided through the META Project helped

some of the main public institutions to reduce the increasing of carbon emissions, with environmental and social sustainability” (ONU NEWS, 2020).

In addition, the report “Global Trends in Investment in Renewable Energy 2020”, elaborated by Unep, the School of Collaboration Center of Frankfurt-UNEP and Bloomberg-NEF (BNEF), showed that, due to technological improvements, “the cost of renewable energy installation is lower, which means that future investments will result in better results” (NAÇÕES UNIDAS BRASIL, 2020).

Bonelli and Lazzareschi (2015, p. 238) affirm that

the biggest challenge will be to create development paradigms, according to which the preservation of the environment and the promotion of employment are mutually supported, forming a virtuous circle, which implies investments in scientific and technological research for the continuous improvement of the techniques of environmental preservation.

Finally, progress has been made in promoting decent jobs for women and men during the energy transition, based on the UN Sustainable Development Goals, taking as an example the cooperation between Irena and ILO in 2021. Paying extra attention to vulnerable groups such as indigenous peoples and marginalized groups should be a priority (EPBR, 2021). This scenario is reinforced in the document “Wind energy: A gender perspective” elaborated by Irena in 2020. By portraying that in the renewable energy segment, there is still a small participation of women in the areas of science, technology, engineering and mathematics when compared with the administrative area.

Initiatives like these, which recognize the importance of the energy sector and its high capacity to influence – positively or negatively – on socio-environmental issues, evoke the creation of green jobs. In a context of socioeconomic crisis, this strategy acquires even more value, therefore, countries are invited to give priority to clean energy in their post-Covid-19 recovery packages.

FINAL CONSIDERATIONS

The debate around activities related to green jobs guided by ethical values can be an alternative to a low carbon economy and neutralization of the environmental footprint while promoting social sustainability.

The generation of clean energy finds in the renewable energy sector a promising scenario regarding the generation of green jobs. However, it was found that this depends, among other factors, on working conditions in which less polluting productive activities prevail from investments for the generation of new technological knowledge and the promotion of green jobs.

This view is based on the contradiction, addressed in the theoretical framework, that a job that contributes to the environment is not automatically a green job. For it to be, in fact, it is necessary to fulfill requirements that go beyond the environmental dimension, encompassing the multiple expressions of sustainability.

In an environment marked by the profound socioeconomic crisis caused by the Covid-19 pandemic and the ongoing climate emergency, Brazil may require, more than ever, a shift towards sustainable development, which can be promoted by green jobs.

However, this article highlighted that this transformation is linked to a profound reorientation of public policies and national and industrial strategies, something that may hinder its expansion, if there is no objective guidance from government entities, in confluence with the private sector, to achieve the sustainable development through green jobs.

It was concluded that Brazil has the potential to generate green jobs mainly in economic activities related to renewable energies. The initiatives listed in this article show investments in renewable sources of energy and space for greater engagement towards decarbonization. However, the ethical alternative to a low carbon economy requires limiting or preventing the emission of greenhouse gases. Therefore, it is recommended that the economic model of production and consumption values the regenerative economy, and for this path it is necessary, as presented in this study, a new logic of urban organization and recognition of limits regarding greenhouse gas emissions.

Finally, the current study pointed evolutive alternatives in energy industry, although recommend to the future researchers understand other Brazilian industries beyond the business activities faced on this article.

ACKNOWLEDGEMENT

“This study was financed in part by the Coordination for the Improvement of Higher Education Personnel – Brazil (Capes) – Finance Code 001”.

REFERENCES

- ABRAMOVAY, R. Desenvolvimento sustentável: qual a estratégia para o Brasil? *Novos Estudos*, v. 28, n. 2, p. 97-113, 2010a.
- ABRAMOVAY, R. *Muito além da economia verde*. São Paulo: Abril, 2012.
- ABRAMOVAY, R. *O comportamento energético da indústria*. *Jornal Valor Econômico*. 2010b. Available at: <http://ricardoabramovay.com/o-comportamento-energetico-da-industria/>. Accessed on: Apr. 5 2020.
- ASSOCIAÇÃO BRASILEIRA DE ENERGIA SOLAR TÉRMICA. 2019. *Communication with experts*. Available at: <https://abrasol.org.br/>. Accessed on: May 23, 2020.
- ASSOCIAÇÃO BRASILEIRA DE ENERGIA SOLAR FOTOVOLTAICA. 2019. *Energia solar fotovoltaica ultrapassará a marca de 3.000 megawatts no brasil em 2019*, 11 January 2019. Available at: <http://absolar.org.br/noticia/noticias-externas/energia-solarfotovoltaica-ultrapassara-a-marca-de3000-megawatts-no-brasil-em-2019.html>. Accessed on: May 23, 2020.
- AGÊNCIA CÂMARA DE NOTÍCIAS. 2019. *Bolsonaro sanciona PPA com veto a metas de desenvolvimento sustentável da ONU*. Available at: <https://www.camara.leg.br/noticias/629391-bolsonaro-sanciona-ppa-com-veto-a-metas-de-desenvolvimento-sustentavel-da-onu/>. Accessed on: June 09 2020.
- ALDIERI, L. *et al.* Is green innovation an opportunity or a threat to employment? An empirical analysis of three main industrialized areas: The USA, Japan and Europe. *Journal of Cleaner Production*, v. 214, n. 20, p. 758-766, 2019. DOI: <https://doi.org/10.1016/j.jclepro.2019.01.016>
- BARBOSA, N. *et al.* *Indústria e desenvolvimento produtivo no Brasil*. Rio de Janeiro: Elsevier, 2015.
- BATTAGLIA, M.; CERRINI, E.; ANNESI, N. Can environmental agreements represent an opportunity for green jobs? Evidence from two Italian experiences. *Journal of Cleaner Production*, v. 175, n. 20, p. 257-266, 2018. DOI: <https://doi.org/10.1016/j.jclepro.2017.12.086>
- BOFF, L. *Sustentabilidade: o que é, o que não é*. Petrópolis: Vozes, 2016.
- BONELLI, V. V.; LAZZARESCHI, N. Empregos verdes e sustentabilidade: tendências e desafios no Brasil. *Revista de Ciências Sociais*, Fortaleza, v. 46, n. 1, p. 221-242, 2015. Available at: <http://www.periodicos.ufc.br/revcienso/article/view/2440>. Accessed on: May 21 2020.
- DALY, H. E. *Desenvolvimento sustentável: definições, princípios e políticas*. Washington: Banco Mundial, 2002.
- ELKINGTON, J. *Sustentabilidade, canibais de garfo e faca*. São Paulo: M. Books, 2012.

EPBR. *OIT estuda políticas para transição do mercado de trabalho da energia renovável*. Available at: <https://epbr.com.br/cooperacao-internacional-quer-promover-empregos-decentes-para-mulheres-e-homens-no-setor-de-energia/>. Accessed on: January 27 2022.

FREITAS, M.; FREITAS, M. C. S. *A sustentabilidade como paradigma: cultura, ciência e cidadania*. Petrópolis: Vozes, 2016.

GEORGESCU-ROEGEN, N. *O decrescimento: entropia, ecologia, economia*. São Paulo: Editora Senac, 2012.

GIL, A. C. *Métodos e técnicas de pesquisa social*. São Paulo: Atlas, 2010.

GLOBAL TRENDS IN RENEWABLE ENERGY INVESTMENT. 2020. Available at: https://www.fs-unep-centre.org/wp-content/uploads/2020/06/GTR_2020.pdf. Accessed on: June 11 2020.

GUARINI, G.; OREIRO, J. L. An ecological view of New Developmentalism: a proposal of integration. *Brazil. J. Polit. Econ.*, v. 42, n. 1, Jan./Mar. 2022. Available at: <https://www.scielo.br/j/rep/a/N3Swr4xnx3DJN7rd-jGXcsDn/?lang=en>. Accessed on: January 10 2022.

HEPBURN, C. *et al. Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?* Oxford Smith School of Enterprise and the Environment, Working Paper, 2020. Available at: <https://www.inet.ox.ac.uk/files/Hepburn-et-al-2020-Will-COVID-19-fiscal-recovery-packages-accelerate-or-retard-progress-on-climate-change-EMBARGOED-5-MAY-2020.pdf>. Accessed on: May 10 2020.

IDEIA SUSTENTÁVEL. 2013. *Os empregos verdes*. Available at: <https://ideiasustentavel.com.br/os-empregos-verdes/>. Accessed on: June 12 2020.

ILO. International Labour Organization. *Work for a brighter future*. Global commission on the future of work. Brasil: OIT, 2019. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---cabinet/documents/publication/wcms_662410.pdf. Accessed on: May 23 2020.

INVESTSP. 2013. *Economia verde*. Available at: <https://www.investe.sp.gov.br/setores-de-negocios/economia-verde/>. Accessed on: May 5 2020.

IRENA. International Renewable Energy Agency. *Renewable Energy and Jobs Annual Review 2019*. 2019. Available at: https://tecsol.blogs.com/files/irena_re_jobs_2019-report.pdf. Accessed on: May 23 2020.

IRENA. International Renewable Energy Agency. *Wind energy: A gender perspective*. Available at: <https://www.irena.org/publications/2020/Jan/Wind-energy-A-gender-perspective>. Accessed on: January 27 2022.

LITTIG, B.; GRIEBLER, E. Social sustainability: A catchword between political pragmatism and social theory. *International Journal of Sustainable Development*, v. 8 n. 1/2, p. 65-79, 2005. DOI: <https://doi.org/10.1504/IJSD.2005.007375>

LUCENA, J. A. Y.; LUCENA, K. Â. A. Wind energy in Brazil: an overview and perspectives under the triple bottom line, *Clean Energy*, v. 3, n. 2, p. 69-84, 2019. DOI: <https://doi.org/10.1093/ce/zkz001>

MENEGUIN, F. B. *Emprego verde e inclusão social*. 2020. Available at: <https://www12.senado.leg.br/publicacoes/estudos-legislativos/tipos-de-estudos/outras-publicacoes/temas-e-agendas-para-o-desenvolvimento-sustentavel/emprego-verde-e-inclusao-social/view>. Accessed on: June 8 2020.

NAÇÕES UNIDAS BRASIL. 2020. *Queda nos custos da energia limpa pode impulsionar ação climática na recuperação pós-COVID-19*. Available at: https://nacoesunidas.org/queda-nos-custos-da-energia-limpa-pode-impulsionar-acao-climatica-na-recuperacao-pos-covid-19/?fbclid=IwAR0mAbhAGHyE2pzZ5xSCoosIVdD-1vrmiN3UE_RsQapHVpf7-QjkHA0Z5rc. Accessed on: June 11 2020.

NAÇÕES UNIDAS BRASIL. 2015. *Transformando nosso mundo: a Agenda 2030 para o desenvolvimento sustentável*. Available at: <https://nacoesunidas.org/pos2015/agenda2030/>. Accessed on: May 5 2020.

NIETO, A.T. Crecimiento Económico e Industrialización en la Agenda 2030: Perspectivas para México. *Prob. Des.*, Ciudad de México, v. 48, n. 188, enero/marzo 2017. Available at: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0301-70362017000100083&lang=pt. Accessed in: Jan. 10 2022.

ILO. International Labour Organization. *Desenvolvimento sustentável, trabalho digno e empregos verdes*. Relatório V Conferência Internacional do Trabalho, 102ª Sessão. Genebra: Bureau Internacional do Trabalho, 2013. Available at: https://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-lisbon/documents/publication/wcms_745495.pdf. Accessed on: January 02 2020.

ILO. International Labour Organization. 2018. *Greening with jobs: world employment and social outlook 2018*. Available at: <https://www.ilo.org/weso-greening/#Intro-1>. Accessed on: May 1st, 2020.

ILO. International Labour Organization. *Empregos verdes no Brasil: quantos são, onde estão e como evoluirão nos próximos anos*. Brasil: OIT, 2009. Available at: https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/---ilo-brasilia/documents/publication/wcms_229625.pdf Accessed on: May 23 2020.

OLIVEIRA, F. P. M.; CAMPOS, C. P. S. G. Uma análise das relações laborais nos parques de energia eólica sob a perspectiva do emprego verde e do trabalho decente. *Direito e Desenvolvimento*, João Pessoa, v. 8, n. 2, p. 228-246, 2017. DOI: <https://doi.org/10.25246/direitoedesenvolvimento.v8i2.561>

- OLIVEIRA, F. P. M.; CECATO, M. A. B. Trabalho decente e emprego verde: uma análise à luz do caráter pluri-dimensional da sustentabilidade. *Revista Direito e Sustentabilidade*, v. 2, n. 2, p. 207-225, 2016. Available at: <https://www.indexlaw.org/index.php/revistards/article/view/1308>. Accessed on: Apr. 5, 2020.
- ONU NEWS. *Novo projeto do Banco Mundial modernizará setores energético e mineral do Brasil*. 2020. Available at: <https://news.un.org/pt/story/2020/05/1714952>. Accessed on: June 10 2020.
- ORTEGA, M. *et al.* Analysing the influence of trade, technology learning and policy on the employment prospects of wind and solar energy deployment: The EU case. *Renewable and Sustainable Energy Reviews*, v. 122, p. 1-17, 2020. DOI: <https://doi.org/10.1016/j.rser.2019.109657>
- PAULI, R. I. P.; GRECO, L. F. Incentivos governamentais e demanda por empregos verdes nos setores público e privado do Brasil. *Revista Iberoamericana de Economía Ecológica*, v. 27, n. 1, p. 36-47, 2018. Available at: <https://redibec.org/ojs/index.php/revibec/article/view/89>. Accessed on: June 12 2020.
- DI PIETRO, S. Acuerdo de París: ¿Nuevos compromisos con el medio ambiente o nuevas oportunidades de negocio? *Estudios Internacionales*, Santiago, v. 51, n. 192, p. 57-70, abr. 2019. DOI: <http://dx.doi.org/10.5354/0719-3769.2019.52814>
- PINSKY, V.; KRUGLIANSKAS, I. Inovação tecnológica para a sustentabilidade: aprendizados de sucessos e fracassos. *Estudos Avançados*, v. 31, n. 90, p. 107-126, 2017. DOI: <https://doi.org/10.1590/s0103-40142017.3190008>
- PNUD. Programa das Nações Unidas para o Desenvolvimento. 2019. *Relatório do Desenvolvimento Humano 2019*. Além do rendimento, além das médias, além do presente: desigualdades no desenvolvimento humano no século XXI. Available at: http://hdr.undp.org/sites/default/files/hdr_2019_pt.pdf. Accessed on: May 3rd, 2020.
- PNUMA. Programa das Nações Unidas para o Meio Ambiente. 2008. *Empregos verdes: trabalho decente em um mundo sustentável e com baixas emissões de carbono*. Available at: http://www.oit.org.br/sites/default/files/topic/green_job/pub/empregos_verdes_rumos_257.pdf. Accessed on: Mar. 10 2020.
- PNUMA. Programa das Nações Unidas para o Meio Ambiente. 2020. *Global trends in renewable energy investment*. Available at: https://www.fs-unep-centre.org/wp-content/uploads/2020/06/GTR_2020.pdf. Accessed on: May 2nd 2020.
- PROCELINFO. *Centro Brasileiro de Informação de Eficiência Energética*. Available at: <http://www.procelinfo.com.br/main.asp?Team=%7B505FF883%2DA273%2D4C47%2DA14E%2D0055586F97FC%7D>. Accessed on: June 13 2020.
- RAWORTH, K. *Economia Donut: uma alternativa ao crescimento a qualquer custo*. São Paulo: Zahar, 2019.
- RICHARDSON, R. J. *Pesquisa social: métodos e técnicas*. São Paulo: Atlas, 1999.
- RODRIGUES, L. P. R. *et al.* O presente e o futuro do trabalho precarizado dos trabalhadores por aplicativo. *Cad. Saúde Pública*, v. 37, n. 11, 1^o dez. 2021. Available at: <https://scielosp.org/article/csp/2021.v37n11/e00246620/> Accessed in: January 10 2022.
- SACHS, I. *A terceira margem: em busca do ecodesenvolvimento*. São Paulo: Companhia das Letras, 2009.
- SACHS, I. *Caminhos para o desenvolvimento sustentável*. Rio de Janeiro: Garamond, 2002.
- SACHS, I. *Desenvolvimento: incluído, sustentável, sustentado*. Rio de Janeiro: Garamond, 2008.
- SEN, A. *Desenvolvimento como liberdade*. São Paulo: Companhia das Letras, 2010.
- SEN, A. *A ideia de justiça*. São Paulo: Companhia das Letras, 2011.
- SIMAS, M.; PACCA, S. Energia eólica, geração de empregos e desenvolvimento sustentável. *Estudos Avançados*, São Paulo, v. 27, n. 77, p. 99-116, 2013. DOI: <https://doi.org/10.1590/s0103-40142013000100008>
- SULICH, A.; RUTKOWSKA, M.; POPLAWSKI, Ł. Green jobs, definitional issues, and the employment of young people: An analysis of three European Union countries. *Journal of Environmental Management*, v. 262, p. 1-6, 2020. DOI: <https://doi.org/10.1016/j.jenvman.2020.110314>
- UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE. 2020. *The Paris Agreement*. Available at: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf. Accessed on: May 2nd 2020.
- VEIGA, J. E. *Desenvolvimento sustentável: o desafio do século XXI*. Rio de Janeiro: Garamond, 2010.
- VEIGA, J. E. *A des governança mundial da sustentabilidade*. São Paulo: Editora 34, 2013.
- VEIGA, J. E. *Desenvolvimento sustentável: o desafio do século XXI*. Rio de Janeiro: Garamond, 2010.

Todo conteúdo da Revista Desenvolvimento em Questão está
sob Licença Creative Commons CC – By 4.0